

SIXPENCE

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An outstanding page in the history of Australian Ham Radio was written ten years ago, when in October 1933, the untiring effort of the above Hams was rewarded by the birth of "AMATEUR RADIO."

Ten years ago, these Hams in their wisdom saw the need for some publication wherein all Divisions would have an equal opportunity of expressing ideas, news and results of experiments. In effect they visualised a magazine to be the mouthpiece of the Federal Organisation. Today, we the present Magazine Committee can truly claim that "Amateur Radio" is an integral part of Ham Radio in Australia.

Bearing in mind that its production is, and always has been a spare time job for the magazine Committee, we can be pardoned for acclaiming its survival as a meritorious achievement that could be brought about only by the spirit of Ham Radio.

After nearly six years of publication, when it was becoming equal to any other magazine published, the outbreak of war inflicted a setback so serious, that it was only by retrenchment to its present form that it was able to survive.

We look to the future with confidence, having already plans for the post-war "Amateur Radio" under consideration awaiting the day when they may be placed in the hands of the printer.

ELECTRONIC VOLTMETERS

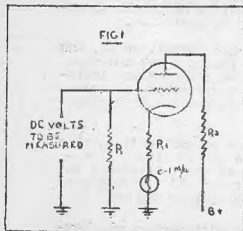
.. From an Article by J. H. Potts ..

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Within the past few years the electronic voltmeter has become widely accepted as one of the most simple accurate and convenient instruments for measuring DC voltages in high impedance circuits.

Essentially the electronic voltmeter differs from other vacuum tube voltmeters in that it is designed to measure DC voltages only. By limiting its application to DC measurements, greater stability, accuracy and simplicity and readily obtained. These advantages are extended to AC measurements when the electronic voltmeter is employed in conjunction with a suitable rectifier. In addition such instruments may be designed to serve as ohm-meters, as well as voltmeters, and in such applications enable measurement of extremely high resistances.

FUNDAMENTAL CIRCUIT .. The fundamental circuit of one of the simplest types of electronic voltmeters is shown in Fig 1. The meter in the cathode circuit of the triode indicates the cathode current. When a negative DC voltage is applied to the grid, the current decreases, and vice versa. Thus the meter may be calibrated to indicate both the polarity and the magnitude of the DC voltage under measurement.



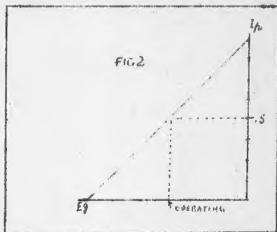
Now let us see what design considerations are involved in this simple circuit. First to complete the grid circuit when the voltmeter is disconnected from the circuit under test, the resistor R must be used. A high resistance of the order of 10 megohms, is desirable, since the amount of circuit loading and the ohms per volt rating depend upon the value of the resistance chosen. Thus, if R is 10 megohms and the meter is calibrated to read up to 5 volts negative or positive the sensitivity is

equal to 2,000,000 ohms per volt. To duplicate this sensitivity using a microammeter and a series multiplier, without the vacuum tube, would require a center zero meter designed to deflect to full scale in either direction for a current of 2.5 microamperes..

Damage due to accidental overload of the meter in the electronic voltmeter may be guarded against in the design. R2 serves as a limiting resistor which prevents the plate current - and cathode current - from rising to extreme values should the applied positive voltage exceed the range of the meter. When the applied grid voltage is negative the cathode current decreases, so the only effect of excessive voltage of negative polarity is to reduce the meter current to zero, so no damage can possibly result.

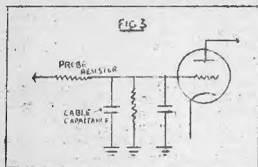
The use of the cathode resistor R1 provides degeneration so that greater stability is secured. Minor variations in tube characteristics then have negligible effect upon the calibration of the meter. However, R1 must not be too high in value, otherwise the tube will function as a detector and alternating voltages in the circuit under test will produce a rectified voltage which will register on the meter. To avoid this the cathode resistor is so chosen that the bias applied enables the tube to operate as a class A amplifier, and the plate voltage is selected to meet the range of the meter chosen.

OPERATING POINT .. A grid voltage, plate current characteristic of a typical triode is shown in Fig 2. Note that the operating point is chosen at a grid bias which produces a plate current of 0.5 Ma. The voltages and resistances in the circuit are so chosen that this value of plate current occurs in approximately the middle of the straight portion of the $E_g - I_p$ curve. Thus a 1M/a meter will read half scale when the electronic voltmeter is operating, but with no test voltage applied. If this point on the voltmeter scale is calibrated as zero, then a 5 volt change in negative direction will cause a similar deflection in the opposite direction. It should be noted that, although changes in tube operating voltages will cause an increase or decrease in the meter current, they will not affect the calibration provided means are employed to re-adjust the plate current to 0.5.



PREVENTING RECTIFICATION ... Since the operating point chosen is such that the deflection in a positive direction is substantially the same as that in a negative direction for equal voltages of polarity, it follows that AC voltages within the operating range of the voltmeter

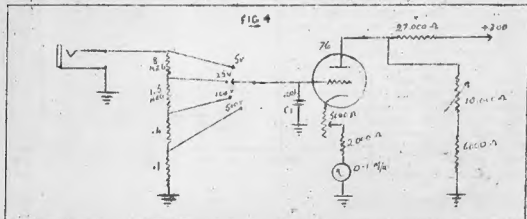
will not be rectified provided they are of pure wave form. If however, the alternating voltage applied is unsymmetrical in form, or of sufficient magnitude to drive the bias beyond cutoff, rectification will result unless special precautions are taken. This is done by employing a simple resistance-capacity filter in the grid circuit, as shown in Fig 3. The resistance can be placed in the probe end of the shielded cable which plugs into the input terminals of the electronic voltmeter.



A small capacitance, of the order of 0.001 mfd is placed across the input circuit. The grounded shield forms the balance of the capacitive section of the filter circuit. By placing the resistor in the probe the shielded cable capacitance is effectively isolated from the circuit under test, and it becomes possible to measure DC voltages in tuned circuits without introducing any more loading than would result if the isolating

resistor alone were shunted across the circuit under test. Since it is possible to make this resistance 1 megohm or more, measurements of DC in radio frequency circuits are thus made possible without appreciable detuning effect.

COMMERCIAL DESIGN .. The complete circuit of a typical commercial design of electronic voltmeter, as employed in signal tracing instruments of various types is shown in Fig 4.

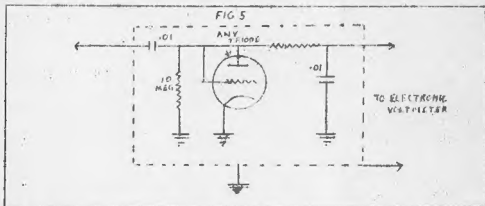


The filter condenser C1 is limited to a capacity of 0.001 mfd while a larger capacity would provide greater attenuation of AC voltages arriving at the grid, it would also increase the time constant of the input circuit to the extent that the interval required for the charge accumulated on the condenser to leak off

would become appreciable. During the period over which this charge is hold, the voltage applied to the grid remains effective, so the meter pointer does not return to zero until this charge is dissipated.

The 5000 ohm rheostat shown in the cathode circuit is adjusted to give the required sensitivity for the particular tube chosen. Once adjusted this rheostat seldom requires change when replacement tubes are substituted, except when the replacement differs widely in characteristics from that for which the original calibration was made. The 10,000 ohm variable resistor is used to compensate for power supply changes. The normal applied plate voltage (at the tube plate) is 70 volts.

RADIO FREQUENCY MEASUREMENTS ...R.F. measurements with the instrument can be made available by the use of a simple vacuum tube rectifier such as that shown in Fig 5.



The leads to the electronic voltmeter from the rectifier carry only DC and may therefore be quite long without causing difficulties. It should be particularly emphasized that the input resistor of the electronic voltmeter must be open circuited when this rectifier is employed, otherwise the sensitivity of the instrument will be appreciably reduced. The "Contact" potential of the rectifier will produce a reading on the electronic voltmeter, even when no AC voltage is being measured, but this may be taken into account when calibrating the instrument for AC, which must be done in any event. The readings for AC will be proportional to the positive peak of the voltage being tested. This will cause no error in measuring sine waves, but inaccuracies will result if complex waves are being measured.

....000....

TRANSITRON OSCILLATORS

Wide Range and High Frequency stability with untapped coils.

From an article in "Wireless World".

.....

Most readers are familiar with Hull's famous dynatron oscillator. A similar circuit, not so well known, is the negative transconductance oscillator which has been named the Transitron.

This oscillator possesses essentially the same type of negative resistance characteristic as the dynatron, having all its advantages without its disadvantages. Its characteristic is independent of secondary emission and remains practically constant for the life of the valve. It is a low power oscillator and will oscillate from 600 c/s to 60 Mc/s by changing the value of the associated L/C circuit.

It is claimed that changes in frequency resulting from a 53% change in screen volts may be kept within 10 parts in 10⁴. Another great advantage is that no coil tapping is required as in other types of oscillators. All that is necessary to switch from 160 to 5 metres is to change the coil.

The writer first built up a battery model on a bread-board. The circuit shown in Fig 1, the action being as follows:- Negative voltage applied to the suppressor caused electrons that have passed through the screen to be returned. Over a certain range, a positive increment of suppressor voltage allows more electrons to go to the anode, and thus decreases the screen current, which means that the suppressor-screen transconductance is negative. When this negative resistance becomes equal to the equivalent resistance of the tuned circuit (R1 in Fig 1) oscillation results.

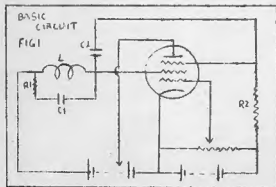
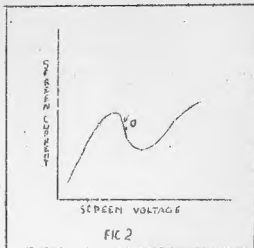


Fig 2 shows the screen current screen voltage characteristic O being the operating point. The relative values of C2 and R2 are important, if they are so small that the reactance of C2 is appreciable in comparison with R2 at the desired frequency of oscillation, then the voltage dividing action of C2 and R2 causes the change of suppressor volts to be less than that of the screen, and the system stops oscillating.

...

It is desirable to keep the amplitude of oscillation small, so as to keep the wave-form and frequency stability good. If a small negative bias is applied to the control grid, the total current flowing to the screen may be controlled and the negative slope of the current/voltage characteristic may be varied. Hence a flexible means is available for varying the magnitude of the negative resistance and thus the amplitude of oscillation. By arranging for the oscillation voltage to regulate the bias on the control grid, additional amplitude control may be obtained.



It was found that with the breadboard layout good oscillation was obtained down to 30 Mc/s. The circuit was then built up on a small metal chassis, a one point earthing system adopted and a Mullard EP50 placed in the circuit. (Other suitable pentodes suggested are types 57, 58, 59, 6C6, 6J7 and 6K7). With suitable inductances the circuit was found to oscillate satisfactory down to a wavelength of $3\frac{1}{2}$ metres.

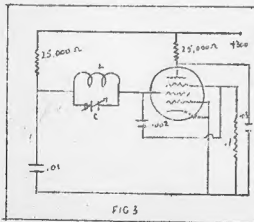


Fig 3 shows the circuit used. It will be noted that the suppressor bias has been omitted, as it was found unnecessary with this type of valve.

The enormous scope for this oscillator will be seen from the following list of advantages.

- (a) Stability
- (b) Simplicity
- (c) Ease with which output can be controlled
- (d) Purity of waveform
- (e) Ease in band changing (only one inductance required)
- (f) Almost any pentode valve will suffice.

The only disadvantage seems to be that only low outputs can be expected if (a) and (d) are to be satisfied. Some suggested uses for this type of oscillator are as follows:- (a) general purpose oscillator that will cover from 600 cycles to 60 Mc/s with variable amplitude control. (b) Oscillator in a superhetrodyne--no tapping on coil to cause switching trouble. (c) as a frequency meter, and (d) it should make a good variable frequency control for a 'Ham' transmitter when the good days return again.

SLOUCH HATS and FORAGE CAPS.

Well, well...how are all the babe daughters???...the 2YC sons are doing fb, thanks very much. Hi!

Into the shop at 2YC the other Sunday morning lobbed one of the old VK DX Merchants, one 2LZ. Con looks very fit and seems to have landed, at long last, a job right suited to him, "fixing up things" as any Sydney Ham can vouch for - that's Con's long suite. And I think Con would rather regret the day he loses the W.O. rank and gets a Commission where he would only be "seeing others fixed things" and I'm sure Con would rather be the "fixer" himself.

Pilot Officer (ahem!) Ray Carter VK2HE seems to have landed up in V4 and is very keen on his work, which seems to take him seeing the sights. Says he sees hams "everywhere". Well, where are those notes om, haven't you seen what the Navy can do and they never leave FCT. Incidentally Wally wants to know how many times you want "Amateur Radio" redirected per annum. If it was pecc-time we would know it was simply a matter of nonpayment of rent.

Sq/Ldr. Morris Myers is still in VK3 and I believe 44W is with him. What are you these days Arthur, and when are you coming up for the evening?

Frank Goyen 2UX our old VK2 WIA President now a Flight Loot up Wagga way is lighter by quite a few nice gallstones which he, so I believe, intends to see if they act like quartz .. grind me one for 7 mc, Frank, om.

VK2ALG Lt. Joe Ackerman is back again in Australia's Never-never country and once more the possessor of an outside in Moustaches which, "he" claims is the envy of all. Reckons the catch is that he has many times been pulled up by complete strangers being mistaken for 2OZ John Olle...but adds he can live that down, perhaps. Hi! John if you are in VIS 'phone reply to MUL092. Hi!

2ALG has met quite a cross section of Ham Radio, including 044M. One day he had lunch with a Fl/Lt and during the meal he was asked if he had any sigs experience before the War, on mentioning Militia, PMG and Ham Radio the visitor turned out to be 3CX who was associated with 3EM, 6JW 5ZX and ZL2SK among others. I wonder how many times in how many various climates has this search for a brother Ham ended thus? Joe mentions meeting W3HHO, W6NFO and W5HRX, the last being a Ham and a Doctor with a brother home in the States also a Ham and also a Doctor...as 2ALG ad's..Ripley. 2AMP, 2GG. 2KE, 2FN, 3XB, 2AFI and 4VZ are also mentioned by 2ALG and some details of them would fill up quite a few lines of your page, oms.

By the way 2AFN Tom Slawson was mentioned as a POW in the official lists issued lately.

From Cpl. Dixon VK3te, stationed around Albury way, after much "touring" around the country came a note of his whereabouts. Glad to hear from you, om, and passed it on the FL/Lt. Jones. We hope to take you for another smble around VIS very soon. 3TE mentions that 32D Ron Williams is now a Loot in the Army over in VK6, while 34B Jack Mills another Loot is at Bonegilla. 3WL Wally Nere is now a Major and is stationed in VK2 these days.

Oscar Blyth 3XW a W.O. in R.A.A.F. is now doing duty in the tropics. Some of the Hams up there should be due for leave shortly. 24L for one seems to have had a long spell up there. How goes it Frank.?

VK2HO still languishes down in VK3, but seems to get about a good deal and renew acquaintance with many VK3's and the VK2's that sojourn down in the "cold country."

L/Tel Sid Clark is still down at Flinders Naval Depot and even met a Ham who got in touch with him by reading Amateur Radio. So you see we grow in advertising value and very soon we will be charging to even mention your call in the column. Hi! Remember me to Ken Bracken, haven't seen him since the Millers Pt. days.

I see where Sgt. Pilot Cec Light was on leave in London according to the Sydney Sun, but how long ago that was is a matter for very much conjecture, as you can all imagine.

Herb Stevens 3JO mentions that getting news of Hams is pretty hard going, as most of the news is "taboo" Herb's brother Bob 3OJ (Hope I have the right call sign for the right brother!!!) has been up in VK9 for over six months keeping the rigs going, with a spot of brasspounding whenever there is a shortage of ops. another case of the "useful ham" able to combine more than one job. Bob has also met W7GTH who is attached to a unit nearby and much midnight oil has been burnt yarning about "Ham Radio."

3OJ mentions that 3VH is now Major Hobbin in case it has not appeared in this column before. So the Hams are creeping up in the Army too as we have two Majors in this issue...anything higher than Majors offering oms??? Has anybody ever worked out of the Non Coms in the Navy????

3VH of VK3 Field Day fame certainly deserves his Major being called up at the outbreak of the War and seeing service in the M.E. in Libya, Crete, Greece and Syria and as soon as he returned home was at once sent to New Guinea, where his promotions began. He is back in VK again now and his job is too slow. HI!

And now my usual "wince" as you all call it. I want some more notes as I haven't a solitary one left over for the next issue, having used up my "reserves."

D I V I S I O N A L P O T 13.

.. Federal Headquarters ..

Federal Headquarters are in receipt of a letter from the China Amateur Radio League who state that it is their intention to hold a Convention and Exhibition in Chungking on 1st. January 1941. The C.A.R.L. ask for an Exhibit of equipment from the F.I.C. or failing that a collection of QSL cards.

The Executive felt that it would be impossible to forward equipment to China, but every endeavor should be made to forward a collection of QSL cards and that Divisional Secretaries be written to and asked that they contact their members in an endeavor to obtain cards. These cards to be forwarded to the Federal Secretary, who would arrange for their transmission to Chungking.

In addition it was decided that the necessary authorities be approached with a view of arranging a broadcast over the National Shortwave Network similar to that arranged by the A.S.G.B. and the A.M.K.L.

N.E. SOUTH WALES DIVISION

The September General Meeting of the New South Wales Division held at the M.C.A. Buildings, took the form of a Pictur. Night in aid of the Australian Comforts Fund "Adopt a Soldier Scheme." The function was a great success no less than Thirteen pounds being realised - sufficient to keep five soldiers in comforts for twelve months. As the Division was already keeping one soldier this makes our total, six. Our object is ten and the manner in which donations continue to roll in make it reasonably certain that this object will be attained.

Quite a number of interesting visitors were present including Val WSMWO, Jim ZLGRF, Frank ZLSCD, and Cec Horne 2A1K. In view of the ceremony to follow, it was fitting that 2A1K should be present. As most of you chaps know Cec was secretary of the Division at the outbreak of war and was always well known on inaugurate some form of amateur communication per medium of U.H.F. and drew up several schemes for submission to the authorities. Cec, who was on leave from his unit, is also a World War 1 veteran and joined up with the "Old and Bold" early in this war.

Another pleasing feature of the attendance was the number of ladies present, not forgetting, of course, a few junior operators. Wonder if anyone recognised VL2JY?

Our thanks go to Messrs. Bennett and Nood together with their assistants who went to no end of trouble to provide a very interesting entertainment. Thanks, fellows!

During intermission the E.C.N. Trophy was presented to Section Leader Charles Fryar, VK2NP, who was in charge of VL2JL. The presentation was made by the chairman who pointed out to Members the sterling work performed by 2NP, both as an operator and as Traffic Manager. These remarks were supported by the secretary who stated that 2NP could be given the title of "a real good ham" without any fear of contradiction. Mr. Fryar in his reply paid a tribute to his fellow workers and stated that anything he had done was purely and simply a desire to help Amateur Radio.

The chairman brought under the notice of members, a letter received by Federal Headquarters from the China Amateur Radio League, and suggested that they hand into the Secretary their Qsl cards for transmission to Chungking.

At the time of writing, no decision had been made regarding the Annual Dinner. All members were circularised and although the majority of replies received were in favor, very few members could say definitely that they could attend.

EMERGENCY COMMUNICATION NETWORK.

The Second Series of the New Message Handling Contest has just concluded and what a series it was! Thirteen points covered seven of the competing stations. At the end of the first fortnight anyone of the seven had a chance of winning, but from then on 2JC and 2JL put on a great spurt with the result that at the end of the month they finished equal in the point score. It was a great performance on the part of both stations and the fact that they scored an equal number of points is indicative of their operation. Scoring 195 points out of 200 is pretty good going. Congratulations chaps.

Here is the complete Point Score for all stations:-

VL2JC	195	VL2JK	183
VK2JL	196	VL2JF	182
VL2JF	187	VL2JE	153
VL2JG	186	VL2JN	48
VL2JJ	185		

The above points denote a high standard of operating. Last month VL2JJ won the Point Score with 188. This month scoring only three less, they could only make fifth place. So you see you can't afford to lose a single point.

VL2JC. Congratulations chaps. You certainly put up a fine performance. If my memory serves me rightly, you started off in "B" Division, but this did not worry you. Over the last few months

no stone was left unturned to improve this station. Never mind Eric, practice, practice, practice.

- VL2JL Well done fellows; This station has been knocking at the door for a long time and was runner up to VL2JI in the First Message Handling Contest. They tell me all the boys are very pleased about the Code Session. Whatsa George?
- VL2JP. This station has done particularly well. It is a newcomer to the Network and is real Dx for Control. Operators "Shorty" Higgins and Ron Richardson are doing a fine job. All operators will join in wishing "Shorty" all the best in married life. So you decided to get married instead of buying a sheepskin to keep you warm. Well, well, well. Think I must have known something that day at Liverpool, om. You reckon?
- VL2JG. Gained another two points this month, but dropped back to fourth place. A falling off in signal strength was the main cause. Even 2NP and his impeccable procedure couldn't counterbalance.
- VL2JJ. A falling off in quality caused this station to drop back. These chaps are a keen bunch of workers, but I think you were over anxious to do well this time fellows, and this caused your downfall. Never mind, keep the Cup has another four months to run yet and you're still in the lead. Be careful though.
- VL2JK. A particularly fine performance on the part of Ern Hodgkins, Ken Davidson & Co. 2JC, 2JJ and 2JL will have to look to their laurels from now on or I'm a poor judge. Glad you took that mike in hand, Ken. Its not so bad is it?
- VL2JF. This station has shown considerable improvement, but unfortunately they had one bad period very early in the series that militated against their chances. Keep it up fellows. Its going to be tough next month.
- VL2JE. Has at last managed to put in a consistently strong signal at Control but they can't hear VL2JB. Wouldn't it! These chaps are worthy of a real good pat on the back for the manner in which they stick to the job. They've certainly had some trials and tribulations. By the way Jack, how's that generator?
- VL2JN. Old Rip Van Winkle has come to light at last so much so that he gained all his points in one session. Now listen oldtimer, keep it up and lets hear from you every week. I'm sure you would like to see that cup on the Cocktail Cabinet sometime or other.

-----xxx-----

WESTERN AUSTRALIAN DIVISION

.. Emergency Communication Network ..

Since last writing these notes, members have had little to do in the way of message handling and such like, but much time and energy has been spent in completing the installation at Central Control.

It is very gratifying to those concerned to see the Transmitter and associated equipment operating so well. Many difficulties have cropped up, during the period of construction and installation, but the manner in which they were overcome reflects great credit on the persons of 6GM and 6LW and they are to be congratulated on an excellent job.

Little time was lost in making use of the Central and Mobile equipment. A Synthetic Exercise was held on the evening of July 30th involving Metropolitan Communication Staffs, and this date will be remembered by ECN members as marking the official use of the Emergency Network.

Without going into minute details of the exercise, it can be said that the ECN provided the necessary communications from several bombed out centres with little or no difficulty and in quick time.

6GM was in control at the Central Installation whilst the Mobile equipment was in the hands of 6FL and 6HL. Message handling being done by members of the Control Centres visited. This method leaves room for improvement as far as operation of the Mobile station is concerned and in future it is intended that the Mobile operators themselves will do all and any message handling by that unit.

Further to the above mentioned exercise ECN members had a surprise call at 0600 hours on the morning of August 3rd, and proved they could take it, by manning all stations in good time.

In this case they were not officially called upon to provide communication but they took the opportunity of conducting a further series of tests. This call showed up a few weak points which will have to be remedied in the near future.

Generally speaking ECN members are pleased with the results attained so far, but it is felt that a greater number of stations is required and that is a matter that Civil Defence Authorities will have to give careful thought in the near future.

There is still a great deal of work to be done, and with continued support from all members we may rest assured that the ECN in this State will grow bigger and better and will not be found wanting if the real test ever comes.

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The Division meets on the Third Thursday of each month at Y.M.C.A. Buildings, Pitt Street, Sydney, and an invitation is accorded to all Amateurs to be present.

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